Achieving triple bottom line performance: highlighting the role of social capabilities and environmental management accounting

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Achieving triple bottom line performance: highlighting the role of social capabilities and environmental management accounting

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Abstract

Purpose – The relationship between the elements of the triple bottom line (TBL) is a controversial area that is constantly debated in the sustainability literature. This study addresses this debate by testing the relationships between these elements, while considering environmental management accounting (EMA) as a mediating influence.

Design/methodology/approach – This paper examines survey responses from upper-level managers from ISO 14001-certified manufacturing companies listed on the Indonesian Stock Exchange (IDX). The hypotheses were tested using a partial least squares approach, and bias-corrected and accelerated bootstrap confidence intervals were used to test the significance of the relationships between variables.

Findings – The authors found a direct relationship between the TBL elements and the role of EMA and social performance in mediating the relationship between economic performance and environmental performance.

Research limitations/implications – This research also provides new insights into the progress of the social resource-based view (SRBV) theory, where the social element missing from the TBL approach can be found.

Practical implications – The findings of this article imply that it is worthwhile to invest in corporate sustainability because it is thereby possible to simultaneously achieve economic, environmental and social performance, since such elements are truly integrated. In addition, possession of EMA management tools is necessary to enhance the relationships between economic performance and environmental performance. Furthermore, social performance seems to constitute an important bond between both of these, indicating that the social element of the TBL is necessary to achieve truly competitive performance.

Originality/value – This study contributes to the corporate environmental management literature by providing empirical evidence regarding the TBL elements.

Keywords Corporate sustainability, Triple bottom line, Environmental management accounting, Corporate environmental performance, ISO 14001

Paper type Research paper

1. Introduction

In the past decade, research topics within the fields of sustainability, cleaner production and environmental issues have been discussed extensively among scholars in various disciplines (Chiappetta Jabbour *et al.*, 2010; Høgevold *et al.*, 2019; Laurell *et al.*, 2019; Orlitzky *et al.*, 2017; Sénéchal, 2017; Solovida and Latan, 2017; Wang and Sarkis, 2017). In particular, the concept

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of the "triple bottom line" (TBL) has become an established theoretical blueprint (Elkington, 1998). The concepts involved in the TBL focus firms not just on the economic value that they add but also on the environmental and social value that they add (Elkington, 2004). This framework has been widely adopted and has led to transformation among firms in engaging with sustainable investment (Dos Santos *et al.*, 2014; Høgevold *et al.*, 2019). However, to date, little is known about the relationships between the elements which make up the TBL, and there is a lack of empirical studies addressing this topic as a whole (Svensson *et al.*, 2018).

Specifically, rather than thoroughly analyzing the relationships between the TBL elements, previous studies have predominantly tested the elements of TBL separately. For example, most research has devoted its attention to the relationship between corporate financial performance (CFP) and corporate environmental performance (CEP) (Albertini, 2013; Latan *et al.*, 2018b; Trumpp and Guenther, 2017; Wagner, 2015), providing mixed results. Such research ignores social performance as the third element of TBL (Cegarra-Navarro *et al.*, 2016; Ullmann, 1985). On the other hand, some studies have also focused on the relationship between corporate social responsibility (CSR) and financial performance, without achieving conclusive results (Brammer and Millington, 2008; Beurden and Gossling, 2008; Orlitzky *et al.*, 2003; Waddock and Graves, 1997). Meanwhile, the TBL assumes that its three pillars – economic, environmental and social – are interconnected and must be integrated in order to achieve competitive advantage (Elkington, 2004). Because there is no general consensus on the relationships between the elements of TBL, and because there is a lack of studies that provide concrete evidence on TBL, there is an urgent demand to reexamine these relationships in a single model (Svensson *et al.*, 2016; Laurell *et al.*, 2019).

This article aims to fill this persistent gap by testing the elements of TBL in a single model using ISO 14001-certified manufacturing companies listed on the Indonesian Stock Exchange (IDX). In addition, we also analyze environmental management accounting (EMA) as a mediator in the relationships between TBL elements (Burritt *et al.*, 2009; Christ *et al.*, 2016; Jasch, 2006). We argue that EMA plays an important role in bridging the relationships between TBL elements, by providing information that is useful to managers' decision-making.

EMA can be understood as a set of management tools that allow companies to improve their CFP, CEP and CSP by providing monetary information, such as costs and revenue, as well as nonmonetary information such as energy, water and material usage or carbon dioxide emissions (Jasch, 2006; Christ and Burritt, 2013). Several previous studies have indicated that EMA is a useful instrument for improving CEP (Ferreira *et al.*, 2010; Solovida and Latan, 2017) in relation to providing information for companies (Burritt and Saka, 2006; Burritt *et al.*, 2019; Chiappetta Jabbour *et al.*, 2013).

We tested our model and collected data in Indonesia, a country with one of the largest levels of economic growth in the world and part of the G20. Indonesia is predicted to become the fourth strongest economy in the world in 2045, according to research conducted by PricewaterhouseCoopers (PwC) in 2017. In addition, Indonesia offers an interesting phenomenon in terms of the TBL model, with previous studies reporting a lack of CEP in firms operating in Indonesia (Burritt *et al.*, 2019; Latan *et al.*, 2018a). According to the United Nations Environment Program (UNEP) report in 2018, Asia-Pacific is the fastest-growing region in the world. This economic boom has lifted many out of poverty, but it has also caused significant environmental degradation, with negative effects on human well-being. Because of these important issues in Indonesia, research specific to the Indonesian context has become an urgent demand.

Our study extends the state-of-the-art research in the field of sustainability and environmental management and provides original evidence in three ways. First, we answer the research call from Svensson *et al.* (2016) to test the elements of TBL in a single comprehensive model. Our study is the first to address these gaps by providing original

evidence on the relationships between TBL elements in a single comprehensive model. Second, our research provides new insights into the development of the social resource-based view (SRBV) theory (Tate and Bals, 2018), which includes the social element missing from the TBL approach. While a plethora of emerging research studies have dealt separately with the relationships between CFP and CEP, as well as CSR and CFP, their results remain at times unclear and contradictory (Beurden and Gossling, 2008; Dixon-Fowler *et al.*, 2013; Orlitzky *et al.*, 2003). Finally, our research contributes to fresh empirical evidence in the context of developing countries, in this case, Indonesia.

The remainder of this paper is organized as follows. The next section presents the theoretical background and development of hypotheses, followed by the research methodology. Subsequently, we present our empirical results. Finally, we discuss these results and provide implications that may be useful for both academics and practitioners.

2. Theoretical background and development of hypotheses

2.1 The natural resource-based view (NRBV) and sustainability

One of the main sustainability theories supporting the relationship between CFP and CEP is the natural resource-based view (NRBV) (Hart, 1995; Hart and Dowell, 2011). The NRBV is an extension of the resource-based view (RBV), which focuses not only on CFP but also on sustainable development, including CEP. The basic assumption of the RBV is that the basis of competitive advantage lies in the application of each firm's unique combination of valuable resources and capabilities to improve efficiency and business performance (Barney, 1991; Newbert, 2007). This implies that only firms that can use resources effectively and have the ability to innovate will gain competitive advantage and, therefore, achieve superior performance. Sustainable competitive advantage is determined based on the firm's ability to reconfigure its valuable and idiosyncratic resources. According to the RBV, these resources should be inimitable, rare and nontradable (Barney, 1991; Hart, 1995; Russo and Fouts, 1997).

Hart and Dowell (2011) evaluated 15 years of the development of the RBV, based on various empirical results concerning the propositions of the RBV, and thus formulated the NRBV. These authors argue that the RBV does not consider CEP, while environmental and sustainability issues in recent years have become widely discussed topics. Therefore, the RBV was revisited. Building on the logic of the RBV, the NRBV describes how firms can achieve competitive advantage by means of cost efficiency relating to environmental issues and minimizing environmental impact across the entire value chain of the firm. Specifically, the NRBV consists of three interrelated strategies: (1) pollution prevention, which focuses on minimizing waste, emissions and effluents with the aim of increasing efficiency and reducing costs; (2) product stewardship, which focuses on minimizing the entire value chain costs of products and thus expands the scope of pollution prevention; and (3) sustainable development, which focuses on sustainable growth of the firm while reducing environmental damage. Hence, the NRBV strategy emphasizes not only financial growth but also environmental aspects (Hart and Dowell, 2011).

However, neither RBV nor NRBV take into account the social dimension of TBL, creating a persistent gap in the sustainability literature. As a result, a large number of studies use the term "sustainability" but, in fact, only investigate CFP and CEP. Driven by this gap, Tate and Bals (2018) propose incorporating the social element of TBL as a complement to the propositions expressed in RBV and NRBV. Thereby, the SRBV is created to show how social capabilities can be used to achieve competitive advantage. Tate and Bals (2018) suggest that the three elements of TBL – CFP, CEP and CSP – must be connected in order to achieve shared TBL value creation.

2.2 The social resource-based view (SRBV) and sustainability

Recently, Tate and Bals (2018) have proposed the SRBV, which emphasizes the role of social capabilities in the achievement of competitive advantage. They argue that social performance has received too little attention in the context of business performance and sustainability. According to Tate and Bals (2018), RBV and NRBV do not capture social performance, the third element of the TBL model. This neglect is due to the RBV focusing on CFP in order to maximize profits, while the NRBV neither focuses on CEP for the preservation of the natural environment nor focuses on social capabilities. Therefore, the SRBV complements RBV and NRBV by focusing more on CSP than CFP and CEP. Inspired by RBV and NRBV, SRBV uses two main strategies: (1) a mission-based approach, which focuses on maximizing social benefits while breaking even and becoming profitable in order to perpetuate the business model and (2) stakeholder management, which focuses on maximizing support in terms of products, information and funds from a broad stakeholder base (Tate and Bals, 2018).

In this paper, we examine the relationships between the elements of the TBL model – CFP, CSP and CEP – while considering EMA as a mediator in these relationships. We test this model simultaneously and explain the relationships between these variables based on our conceptual framework and the results of previous studies, and thus derive our hypotheses. First, we hypothesize regarding the direct effects of the relationships between CFP, CSP and EMA on CEP. Second, we hypothesize regarding the indirect effects between these relationships.

2.3 The relationship between the TBL elements: economic, social and environmental performance

Topics related to social and environmental issues began to be studied around the 1970s, but interest in such issues has grown exponentially in the past decade. Nowadays, firms are not solely focused on short-term performance through reliance on CFP but also consider sustainable performance, which depends on three dimensions: the social dimension, relating to community welfare; the environmental (or ecological) dimension, which relates to the preservation of the natural environment; and the financial dimension, aimed at cost efficiency and boosting benefits (Svensson *et al.*, 2016; Sénéchal, 2017).

In all three RBV, NRBV and SRBV, CFP is the first pillar which supports sustainable performance. In this view, the capabilities of the firm in developing and managing a bundle of resources such as technology, design, procurement, production, distribution and service are the main keys to achieving competitive advantage (Barney, 1991; Hart, 1995; Hart and Dowell, 2011; Russo and Fouts, 1997; Tate and Bals, 2018). The goal is to achieve cost differentiation and to gain a more advantageous position than competitors. A firm that has grown in terms of CFP will in turn pursue sustainability performance by focusing on improving CSP and CEP. By focusing on CSP and CEP, a firm will gain additional benefits and reduce costs across the entire value chain. Hence, an increase in CFP will positively influence the firm's CSP and CEP. For example, companies can adopt environmentally friendly technologies, conduct research and development (R&D) to minimize environmental damage and create programs for social responsibility. All of these actions have an impact not only on cost efficiency but also on reputation, image and organizational learning (Lankoski, 2008; Hart and Dowell, 2011; Tate and Bals, 2018).

Several previous studies have found a positive effect based on the relationships between CFP and CEP (Laurell *et al.*, 2019; Svensson *et al.*, 2018; Testa and D'Amato, 2017), CFP and CSP (Brammer and Millington, 2008; Brammer *et al.*, 2006; Waddock and Graves, 1997; Scholtens, 2008) and CSP and CEP (Orlitzky *et al.*, 2017; Garcia-Castro *et al.*, 2010; Laurell *et al.*, 2019; Svensson *et al.*, 2018). Based on the above discussion, we derive the following hypotheses:

H1. CFP has a positive and direct effect on CEP.

H2a. CFP has a positive and direct effect on CSP.

H2b. CSP has a positive and direct effect on CEP.

2.4 Indirect effects between the TBL elements through EMA

Over the past decade, the study of the relationships among the elements of TBL has had a prominent place in the sustainability literature. However, although hundreds of separate studies have been carried out and reported, inconsistent and disappointing results have provoked the recent debate. This is because the relationships between the elements of TBL have continually produced mixed research results. Several metaanalytical studies have revealed that such mixed results found by scholars may be determined further by examining the role of a third variable. Meanwhile, a study conducted by Svensson *et al.* (2018) shows that the role of the third variable works well in analyzing the relationships between TBL elements. Specifically, Svensson *et al.* (2018) found that CSP mediated the relationship between CFP and CEP.

Based on the logic of NRBV and SRBV (Hart and Dowell, 2011; Tate and Bals, 2018), firms that achieve superior performance are not only able to manage CFP but also manage CSP and CEP. In this situation, a firm that has excelled in CFP can directly increase its CEP by adopting environmentally friendly technologies, adopting various quality standards and developing programs related to the environment etc. for cost efficiency (Lankoski, 2008). Conversely, a firm that focuses on increasing CSP will ultimately indirectly increase its CEP as well (Garcia-Castro *et al.*, 2010; Orlitzky *et al.*, 2017; Svensson *et al.*, 2016), given that CSP and CEP are interconnected.

In addition, several scholars have indicated that EMA is an intermediary in the relationships between TBL elements (Ferreira *et al.*, 2010; Christ and Burritt, 2013; Solovida and Latan, 2017). A firm that is successful in managing CEP requires a set of tools that can provide information for decision-making. EMA offers this information, providing information related not only to monetary factors such as costs and revenue but also nonmonetary information concerning energy, water, materials or carbon dioxide emissions. Previous research conducted by Burritt *et al.* (2019), Ferreira *et al.* (2010) and Solovida and Latan (2017) indicates that EMA can mediate the relationship between CFP and CEP. Based on the above discussion, we derive the following hypotheses:

H3a. CFP has a positive and direct effect on EMA.

H3b. EMA has a positive and direct effect on CEP.

H4a. CFP has a positive and indirect effect on CEP through CSP.

H4b. CFP has a positive and indirect effect on CEP through EMA.

3. Research method

3.1 Sample and data collection

The sample in this study is composed of upper-level managers (i.e. general managers, operations managers, financial managers and environmental managers) from ISO 14001-certified manufacturing companies listed on the IDX. Our sampling frame was determined based on data provided by the IDX (www.idx.co.id) and the Indonesian Ministry of Environment and Forestry. According to this database, in 2018, there were a total of 285 companies with ISO 14001 certification operating in Indonesia. We contacted all of these companies to ask them to participate in our survey and received approval from 109 companies.

We conducted data collection between June and December 2018 using an online survey as well as contacting each respondent via telephone calls and emails. We chose this method because it is considered effective for reaching a broad range of respondents at low cost (Dillman *et al.*, 2014; Groves *et al.*, 2009). In order to increase the response rate, we sent several reminder e-mails and made several phone calls to nonresponders. We also guaranteed the anonymity of responses and did not disclose the identity of the companies involved. Finally, we provided a cut-off date of five months for completion of this survey for the purpose of testing nonresponse bias (Dillman *et al.*, 2014; Fowler, 2013).

At the time of the deadline, we had received 91 returned questionnaires; four of these were excluded due to incompletion, giving an overall response rate of 19.95%. We argue that this response is acceptable for studies in sustainability and the environment (Dubey *et al.*, 2017; Wijethilake, 2017), with some studies giving rates lower than this threshold (Christ and Burritt, 2013; Ferreira *et al.*, 2010). However, in order to ensure that there were no biases or differences between respondents and nonrespondents in this survey, we tested nonresponse bias by comparing those who responded early and those who responded late in the survey period (Clottey and Grawe, 2014; Dalecki *et al.*, 1993). For this purpose, we assume that late respondents are similar to nonrespondents, in terms of time taken to reply. We used a *t*-test to assess differences in the means of the two sample groups. Our results did not find significant ($p > 0.05$) differences between these groups of respondents. Finally, we tested for common method bias (CMB), which is another potential source of bias when using the survey method (Siemsen *et al.*, 2010). We used full collinearity variance inflation factors (AFVIFs), an approach proposed by Kock (2015), to assess CMB between the item correlations of two constructs. Our analysis results resulted in an AFVIF value of 2.887 < 3.3, which indicates that CMB does not occur in our measurements.

3.2 Measurement items and scales

In survey-based studies, measurement scales and indicators are crucial elements in order to produce unbiased estimates. We used measurement scales and indicators adopted from previous studies in the field of environment and sustainability in order to avoid scale proliferation. We consider that these indicators have been validated through the test–retest method and are well established. We used multiple indicators rather than a single indicator to measure each construct in the model in order to capture the essence of the variables with a degree of precision that a single item could not attain (DeVellis, 2017). This method aims to reduce measurement errors and improve the validity and reliability of indicators. We measured CFP, CSP and CEP using indicators adopted from Svensson *et al.* (2016), Svensson *et al.* (2018) and Laurell *et al.* (2019). We used a seven-point Likert scale across a total of 15 items, including 6, 4 and 5 indicators to measure CFP, CSP and CEP, respectively. This scale ranges from 1 = "strongly disagree" to 7 = "strongly agree". Subsequently, we measured EMA using indicators adopted from Ferreira *et al.* (2010) and Christ and Burritt (2013). We used a seven-point Likert scale with 12 indicators to measure this construct. This scale ranges from 1 = "does not at all" to 7 = "does to a great extent".

3.3 Data analysis

The structural equation modeling (SEM) method was used to simultaneously test the relationships between unobserved variables in our model. In total, two SEM approaches – covariance structure analysis (CSA) and partial least squares path modeling (PLS-PM) – are available to analyze our data (Henseler, 2021; Jöreskog *et al.*, 2016). We chose PLS-PM due to some favorable considerations over CSA. First, PLS-PM is a soft modeling approach, which uses nonparametric assumptions. Hence, PLS-PM does not depend on the parametric assumptions of maximum likelihood (ML), such as multivariate normality or goodness-of-fit

of model. In addition, PLS-PM avoids the problem of Heywood cases in our data. Second, PLS-PM has a "causal-predictive" nature and aims to predict relationships between variables rather than testing causality to confirm theories (Hair *et al.*, 2019; Pearl *et al.*, 2016). Here, this approach allows us to strike a balance between explanation and prediction, given that our model has a relative scarcity of theory and knowledge. Finally, PLS-PM allows us to test the specific indirect effects between latent variables and conduct a series of robustness tests (Latan, 2018). In this case, PLS offers advanced features with a user-friendly interface.

In this study, we have followed the current guidelines for reporting PLS-PM analysis, which are well-documented in the literature (Latan, 2018; Benitez *et al.*, 2020). Specifically, the three main steps which we conducted and reported are as follows. First, we assessed and evaluated the results of the measurement model. This is intended to assess the validity and reliability of construct indicators (i.e. convergent validity, discriminant validity and internal consistency reliability). Second, we assessed and evaluated the results of the structural model. This is intended to assess the overall fit of the model (i.e. r-square effect size and predictive relevance) and test our hypotheses. Finally, we ran several series of robustness tests to ensure that our main results are not biased (i.e. endogeneity testing, unobserved heterogeneity and nonlinear effects).

Results

We used the SmartPLS 3 software (Ringle *et al.*, 2015) to estimate the parameters of our model. The results of the descriptive statistics for each indicator in the model are depicted in Tables 1 and 2.

4.1 Measurement model evaluation

Before we discuss the empirical findings of our hypothesis testing, it is pertinent to evaluate the measurement model and ensure that the indicators we used are valid and reliable. Based on Tables 1 and 2, we obtained factor loading values for each indicator of the construct, which met the threshold value of >0.708 and average variance extracted (AVE) of >0.50 (Hair *et al.*, 2017; Latan and Noonan, 2017). From these results, we conclude that our respondents understand the definition of the concepts being measured and that their answers converge to reflect the true situation (see Figure 1). We further assessed internal consistency reliability using Cronbach's alpha (α) and Dijkstra–Henseler's ρ_A tests. The threshold values for Cronbach's alpha (α) and ρ_A are recommended to be >0.70. We obtained values above 0.85 for both measures for all constructs in the model (see Tables 1 and 2), thus meeting this threshold value.

Finally, we used the heterotrait-monotrait (HTMT) ratio to evaluate discriminant validity in our PLS model, which is considered to outperform other traditional approaches (e.g. Fornell–Larcker criterion). The threshold for HTMT values of >0.90 indicates conceptually similar constructs, while HTMT values <0.85 indicate conceptually different constructs (Henseler, 2021; Nunnally and Bernstein, 1994). We found HTMT values <0.90 and therefore discriminant validity was met.

4.2 Structural model evaluation

After evaluating the measurement model, the second step was to assess the structural model. We assessed several core metrics, including coefficient of determination (R^2), effect size (f^2), predictive relevance (Q^2) and VIF.

We obtained both R^2 and adj. R^2 values for CFP, CSP and CEP ranging from 0.259 to 0.686. According to Hair *et al.* (2017), these values are included in the weak to moderate category. The predictors in our model produced effect size (f^2) values ranging from 0.093 to 0.792

(i.e. included in the small and large categories), which show the respective contributions of variance in the mod[5] We also assessed the predictive relevance of our model (Q^2). Values of Q^2 larger than zero are considered meaningful. Our model produced Q^2 values ranging from 0.118 to 0.471, depicting small and medium levels of predictive relevance of the PLS model. Finally, we obtained VIF values for each predictor in the model of <3.3, which indicates no high correlation or collinearity between predictor variables in our cases.

4.3 Hypothes[1]esting and empirical findings: direct effects

At this stage, we tested our hypotheses simultaneously through the bootstrapping procedure. Overall, our data and analysis support all the direct hypotheses we pro[2]sed. First, we found the relationships between CFP → CEP, CFP → CSP and CSP → CEP to be significant, with beta (β) values of 0.387, 0.665 and 0.236, respectively, and significance at $p = < 0.01$ at 95% CI. Hence, our empirical findings support H1, H2a an[2]H2b. Additionally, we found the relatio[3]hips between CFP → EMA and EMA → CEP to be fully supported. Specifically, we found beta (β) values of 0.509 and 0.362, respectively, with significance at $p = < 0.01$ at 95% CI. Hence, our empirical findings support H3a and H3b.

Table 1. Measurement model assessment of economic, social and environmental performance

Indicator/item	Code	Mean	SD	FL	AVE	α	ρ_A
(1) Economic performance (CFP)					0.849	0.964	0.966
Our sustainable business practices:							
Improved cost efficiency	ECOP1	5.736	1.045	0.919			
Created a competitive advantage for the company	ECOP2	5.759	0.970	0.915			
Enhanced the company's image in the market	ECOP3	5.690	1.043	0.917			
Contributed positively to other aspects of the company's business operations	ECOP4	5.678	1.045	0.925			
Improved operational finances	ECOP5	5.770	0.979	0.933			
Generated financial benefits for the company	ECOP6	5.678	1.119	0.919			
(2) Social performance (CSP)					0.762	0.896	0.897
Our sustainable business practices:							
Positively impacted "word of mouth" about the company	SP1	5.839	1.123	0.885			
Appreciated by all stakeholders	SP2	5.667	1.002	0.879			
Considered the social well-being of society as a whole	SP3	5.644	0.934	0.846			
Focused on social (i.e. relational or societal) aspects	SP4	5.586	0.941	0.881			
(3) Environmental performance (CEP)					0.745	0.914	0.917
Our sustainable business practices:							
Focused on environmental issues	ENVP1	5.724	0.854	0.840			
Diminished the corporate impact on the natural environment	ENVP2	5.529	0.856	0.848			
Considered the effects of corporate business operations on global warming	ENVP3	5.897	0.983	0.909			
Highlighted each product's footprint on the natural environment	ENVP4	5.920	1.008	0.894			
Addressed activities related to the environmental [3]pact of products	ENVP5	5.724	0.979	0.823			

Note(s): FL is factor loading; SD is standard deviation; AVE is average variance extracted; α is Cronbach's alpha; ρ_A is Dijkstra–Henseler's rho_A

Indicator/item	Code	Mean	SD	FL	AVE	α	ρ_A
(1) Environmental management accounting (EMA)					0.534	0.920	0.935
Please indicate the extent to which your company has done each of the following in the last three years:							
Identification of environment-related costs	EMA1	5.655	1.112	0.869			
Estimation of environment-related contingent liabilities	EMA2	5.540	1.112	0.820			
Classification of environment-related costs	EMA3	5.632	1.095	0.818			
Allocation of environment-related costs to production processes	EMA4	5.678	1.088	0.836			
Allocation of environment-related costs to products	EMA5	5.632	1.052	0.812			
Introduction or improvement of environment-related cost management	EMA6	5.425	0.853	0.650			
Creation and use of environment-related cost accounts	EMA7	5.391	0.987	0.642			
Development and use of environment-related key performance indicators (KPIs)	EMA8	5.322	0.903	0.696			
Product life cycle cost assessments	EMA9	5.276	0.967	0.712			
Product inventory analyses	EMA10	5.322	0.977	0.715			
Product impact analyses	EMA11	5.310	0.986	0.590			
Product improvement analyses	EMA12	5.299	0.924	0.521			

Note(s): FL is factor loading; SD is standard deviation; AVE is average variance extracted; α is Cronbach's alpha; ρ_A is Dijkstra–Henseler's rho_A

Table 2. Measurement model assessment of environmental management accounting

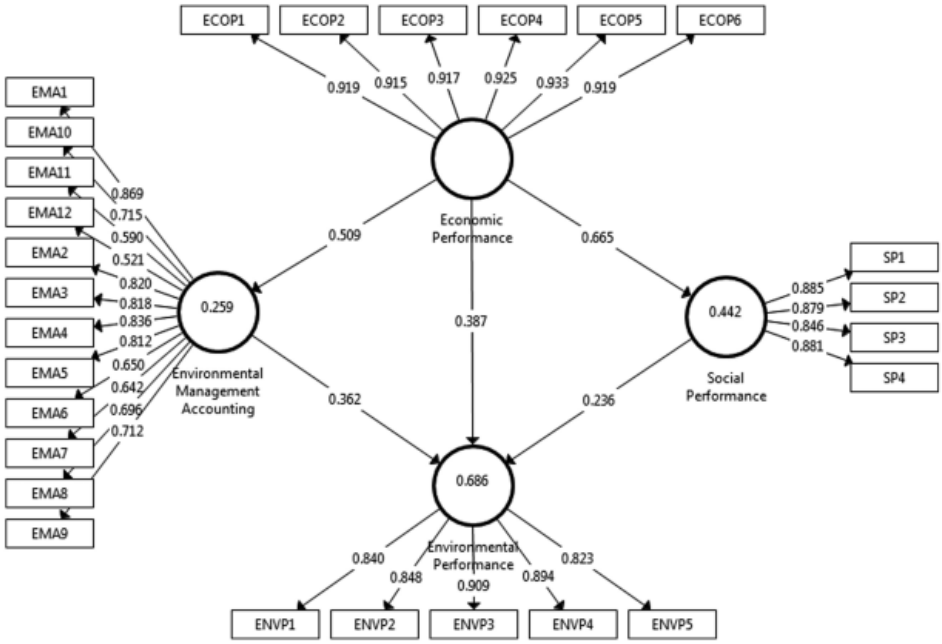

Figure 1. Evaluation of the measurement and structural models

4.4 Hypothesis testing and empirical findings: indirect effects

In addition to testing the direct effects, we also tested the indirect effects to show the role of mediating variables in the relationship between CFP and CEP. Following the guidelines provided by Hayes (2018), we used two main steps to assess the specific indirect effects for multiple mediation analysis, namely determining the significance of indirect effects and their magnitude and determining the type of effect and/or mediation (Vanderweele, 2015). First, we tested the simple cause-effect relationship model (i.e. the model without the mediation variables). Second, we tested the general mediation model (i.e. the model including the mediation variables), evaluated the level of significance and compared the R^2 value of the two models.

We found the results to be as expected, with CSP and EMA acting as mediators in the relationship between CFP and CEP. In particular, we found that the relationships between CFP → CSP → CEP and CFP → EMA → CEP were significant, with beta (β) values of 0.157 and 0.182, respectively, and significance at p = < 0.05 at 95% CI. Given that all the paths we found were significant and positive, this can also be referred to as complementary partial mediation. Hence, our empirical findings support H4a and H4b. Finally, we calculated variance accounted for (VAF) and the difference of R^2 to assess the magnitude of the role of each mediating variable. We found that the difference in R^2 between the model without mediation and the model with mediation ranged from 0.063 to 0.122 > 0.05, with VAF values of 0.224–0.235 < 0.08, which can be considered moderately substantial for mediation analysis (Hayes, 2018; Vanderweele, 2015).

4.5 Robustness tests

We ran a series of complementary tests to ensure the robustness of our main results (Latan, 2018; Lopes de Sousa Jabbour *et al.*, 2020). We tested for endogeneity bias and the potential of unobserved heterogeneity between variables. We tested endogeneity bias to assess the effect of omitted variables, reverse causality and other potential errors (e.g. sample-selection bias). Heckman's test was conducted using a two-step procedure. We found no differences between the models before and after controlling for the third variable, indicating that there is no endogeneity bias present in our case.

Finally, we assessed unobserved heterogeneity to strengthen the robustness of our results. This bias usually occurs during sample selection. We used finite mixture PLS (FIMIX-PLS) to test this bias. After performing multi-method procedures (Sarstedt *et al.*, 2017), we found that FIMIX-PLS gave a final result of k = 1, which indicates that our data are free from this bias.

5. Discussion and implications for theory and practice

The TBL approach has been discussed among scholars in various fields and has been recognized as a way for firms to achieve competitive advantage (Elkington, 2004; Sénéchal, 2017; Svensson and Wagner, 2015). As the relationships between the elements of TBL are a controversy that has been constantly debated in the sustainability literature, research that examines the relationships between TBL elements in a single comprehensive model is necessary (Svensson *et al.*, 2016). Our study bridges this gap by testing the relationships between elements of TBL while considering EMA as a mediating factor and provides new empirical evidence for the Indonesian context. Our main findings can be summarized as follows.

First, we found direct relationships between the TBL elements – CFP and CEP, CFP and CSP and CSP and CEP (Dos Santos *et al.*, 2014; Høgevold *et al.*, 2019; Svensson *et al.*, 2016). That is, the higher the CFP of a firm, the more likely it is to pursue sustainable performance (in

our case CEP and CSP). We found that improvements in operational finance and cost efficiency are the most crucial elements in influencing the CEP and CSP of firms in Indonesia. Thus, firms may allocate a certain amount of their resources to make sustainable investments, which will in turn affect their CEP and CSP. As Elkington (2004) argues, this sustainable investment will provide added value not only in terms of economic aspects but also for the environmental and social aspects. In addition, by adopting environmentally friendly technologies, making R&D related to the environment, creating social programs, etc., this will lead to an increase in firms' CEP. Our results corroborate previous studies conducted by Svensson *et al.* (2018) and Laurell *et al.* (2019) related to the TBL model. In addition, our findings are in line with the propositions and strategies formulated in the NRBV and SRBV theories.

Second, we found evidence of the important roles played by EMA and CSP in mediating the relationship between CFP and CEP. In addition, we also found a direct relationship between CFP and EMA and between EMA and CEP. Our test results indicate that both EMA and CSP act as partial mediators. We argue that EMA helps companies by providing information that is useful for managers' decision-making, concerning both monetary and nonmonetary information. As Adams *et al.* (2004) argue, EMA plays an important role in the relationship between the elements of TBL, and it is considered a managerial tool that helps in corporate decision-making. We found that the role of EMA, related to the identification of environment-related costs and the allocation of environment-related costs to production processes, was the most prominent in this study. Hence, EMA acts as an intermediary in the relationship between CFP and CEP. On the other hand, CSP is expected to mediate the relationship between CFP and CEP because by increasing CSP, CEP will be indirectly affected. We found that CSP related to social activities (such as CSR) can have a positive effect on CEP. Some scholars, for example Skouloudis *et al.* (2015) and Halkos and Skouloudis (2016), have shown the positive effect of CSR in building a firm's reputation. This result supports the findings of previous studies that have identified the roles of EMA and CSP in mediating the relationship between CFP and CEP (Burritt *et al.*, 2019; Ferreira *et al.*, 2010; Solovida and Latan, 2017; Svensson *et al.*, 2018; Laurell *et al.*, 2019).

Our research provides a number of theoretical and practical implications as follows. In terms of theoretical implications, our findings add new evidence to the sustainable literature mainly because this is one of the first studies to examine the elements of TBL in a single comprehensive model for the Indonesian context and also to consider EMA as a mediator. In addition, our findings reconcile mixed results that have previously been tested separately regarding the relationships between TBL elements and show the role of the third variable that works to mediate these relationships (Dixon-Fowler *et al.*, 2013; Grewatsch and Kleindienst, 2017; Albertini, 2013). While previous works have found inconclusive results among TBL elements (Dos Santos *et al.*, 2014; Laurell *et al.*, 2019; Svensson *et al.*, 2016), our results indicate that EMA can help firms to provide information that is useful for decision-making related to achieving shared TBL value creation. Finally, our research provides new insights into the development of the SRBV theory (Tate and Bals, 2018), where the missing element in the TBL approach can be found. In this context, CSP can be considered to support the achievement of sustainable performance.

In terms of practical implications, our findings offer the following contributions. It is worthwhile to invest in corporate sustainability because this approach can result in simultaneous improvement to economic, environmental and social performance, since these elements are in fact integrated (Elkington, 2004). In addition, the possession of EMA management tools is necessary to enhance the relationships between CFP and CEP (Adams *et al.*, 2004). Furthermore, CSP seems to be an important bond between CFP and

CEP, meaning that the social element of TBL is necessary to achieve a truly competitive performance. A focus on social activities such as CSR (Skouloudis *et al.*, 2015) might also add value to the economic and environmental aspects of the firm.

6. Conclusions, limitations and future research directions

This paper discusses the elements of TBL while considering EMA as a mediating variable. The TBL elements tested are CFP, CSP and CEP. All research hypotheses were confirmed, which suggest that the proposed research model is suitable for understanding the relationship between TBL elements and the role of EMA in the context of corporate environmental management in Indonesia, which adds to a broader perspective on the current debate in the field and in the context of sustainability. The main findings of this study indicate that the elements of TBL are integrated with each other and provide added value for all aspects. Therefore, investing in sustainability provides a way for companies to stay afloat and achieve competitive advantage in the current uncertain environment.

Our study has several limitations, which can be noted as follows. First, the sample size used in this study is relatively small, and measurements were only taken from the sample in one time period. Second, our main findings may not be generalizable to other countries. Finally, our results only support the role of the third variable as an indirect effect on the relationships between TBL elements.

We suggest the following directions for future research. First, future studies might consider the role of moderating variables in influencing the relationships between TBL elements. In addition, considering the role of antecedent variables in supporting the relationships between TBL elements, such as environmental committee (Dixon-Fowler *et al.*, 2017) and institutional and stakeholder pressures (Hamdoun, 2020), is an area which may prove fruitful for further investigation. Second, we propose a research call to replicate this study in other country contexts. For example, using the CSR score list from Halkos and Skouloudis (2016) might be useful to make a comparative study between countries. Finally, we encourage future research using a mixed-methods approach to investigate the relationships between TBL elements.

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